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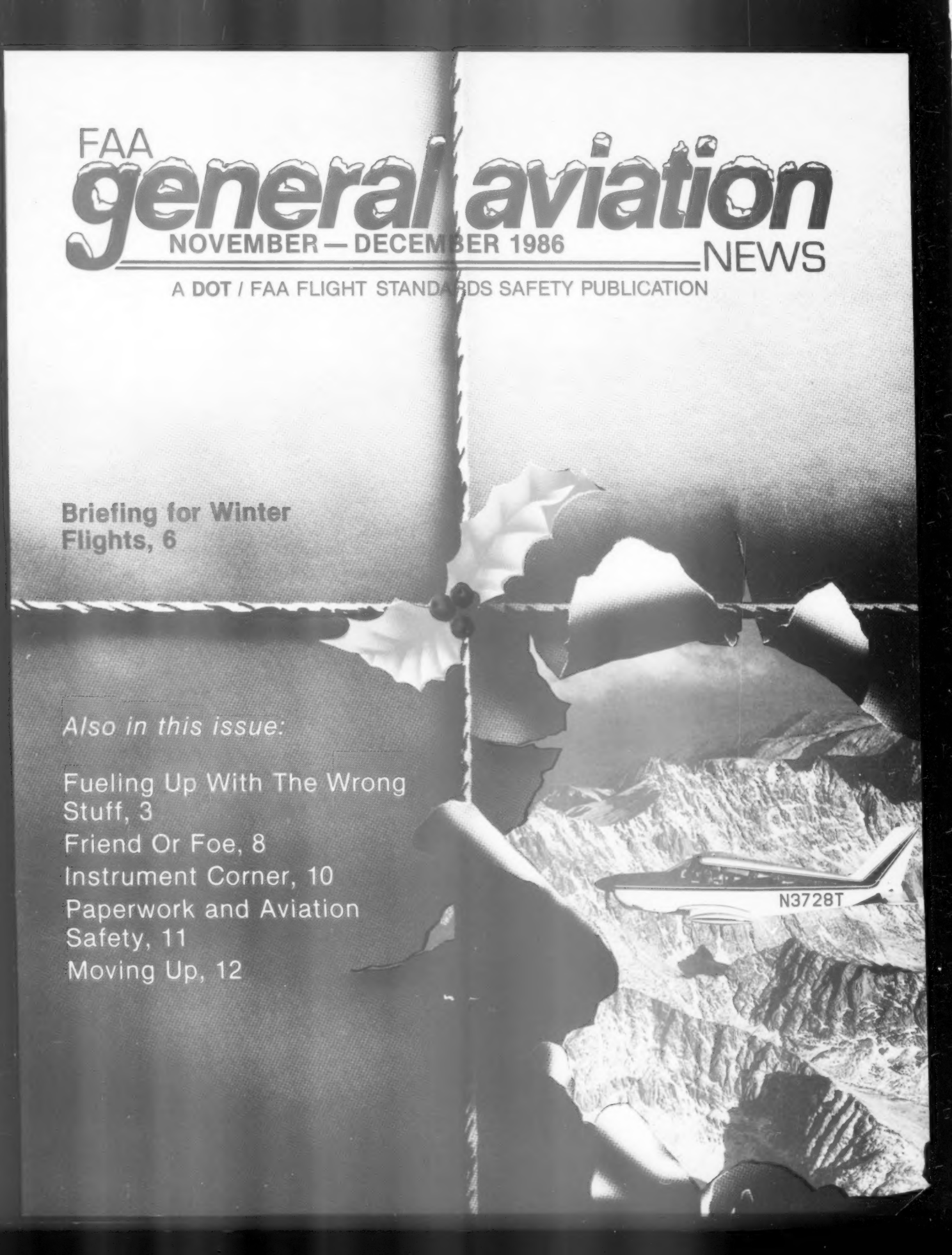

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BRIEFS

THE LIFE YOU SAVE. Satellite transmissions have greatly increased the ability of downed airmen to contact the Air Force Rescue Coordination Center within minutes. However, the percentage of false alarms (inadvertant activation) continues in the 97 percent range, which overloads the response capability of the Center, and may delay rescue tragically.

All pilots can help relieve this overload. Transport ELTs with great care; disconnect batteries if possible. Before and after each flight tune in 121.5. If you hear the ELT "wail", disengage your ELT (this may require qualified help) and contact the nearest FAA air traffic or flight standards office. FAA will then notify the Center, so that any necessary rescue efforts can be called off.

DIPSTICK DROP. The four metal locktabs holding the dipstick to the cap on some Continental model TSIO-520 engines have been corroding away, allowing the dipstick to drop into the oil sump. This releases the spring tension on the oil cap and increases the possibility of the cap vibrating off. This problem has been reported on engines with as little as 450.

UNSET KNOB. Repair stations have recently been reporting inaccurate altimeter calibration on certain altimeters. Some pilots have inadvertently disengaged the barometric scale while adjusting the barometric pressure window setting, using the altimeter set knob. Airworthiness Directive 86-05-02 has been issued pertaining to this problem.

NOTICE TO A & P HOLDERS. FAA considers it mandatory that certificate holders notify the Airmen Certification Branch of any change of permanent address. Failure to do so could result in the denial of certificate privileges. If you have moved and have not notified FAA, fill out AC Form 8060-55, Change of Address Notification (obtained from any FAA district office), and mail it to Airmen Certification Branch, AAC-260, Mike Monroney Aeronautical Center, P.O. Box 25082, Oklahoma City, OK 73125.

THREE'S A CROWD. During the operation of a balloon, the blast valve stuck open, allowing continuous burn. The fuel value was closed at the tank to shut down the burner. Inspection revealed the presence of three copper washers on the blast valve where the manufacturer's specifications called for only one. With the removal of the extra washers the valve worked correctly. Balloon owners should make sure all repairs and maintenance to the fuel burners and valve systems are completed by authorized aircraft maintenance personnel only.

FUELING UP WITH THE WRONG STUFF

INATTENTION CAN LEAD TO BYPASSING ALL THE SAFEGUARDS

Misfueling is an accident cause that simply should not happen. The procedures in use at airports for preventing an aircraft from being provided with the wrong kind of fuel are so redundant that you would expect this problem to be as rare as hen's teeth. But that is not the case. General aviation has recently been responsible for 30 such accidents over a recent five year period, 1978-82, with loss of 40 lives. Only about half of these accidents involved fuel pumped into an aircraft by a fixed base operator, but even this seems incredible, in view of the many safeguards in place.

Fuel at airports is dispensed from pumps or trucks that are clearly marked for the grade of Avgas as well as the type of jet fuel they carry. These distinctions are of the utmost importance for flight safety.

The primary distinction is between jet fuels (essentially kerosene), which are designed for turbine or turboprop engines; and *Avgas* (gasoline), which is required for all types of piston-driven engines. Jet fuels burn at a higher temperature than gasoline, and they burn over a longer period. Mistakenly introduced into a piston engine, they will cause the engine to overheat and "diesel" (ignition on contact with the overheated cylinder). Random ignition results in loss of power, detonation, and complete engine stoppage. Commonly there is enough Avgas in the lines to enable the piston-driven engine to perform normally during startup and taxiing, and there is no sign of trouble until the aircraft is in a critical phase of takeoff or climb-out. (The problem is more likely to surface on the ground if the pilot takes time for a good preflight inspection and a careful engine run-up before takeoff.)

No piston-driven engines of any kind, including turbo-charged engines, can tolerate jet fuel.

On the other hand *some*, but not all, turbine or turboprop engines have a limited tolerance for certain grades of Avgas, on an emergency basis—this can only be determined by reference to the engine specifications. The *unintentional* use of Avgas in turbine engines may lead to engine failure.

In a piston-driven aircraft the use of an Avgas with a lower-than specified octane rating will result in diminished power and ultimately in a buildup of deposits on sparkplugs, valves, etc. The use of Avgas with a higher than required octane rating (100 octane instead of 80 to 90, for example) will have little effect on the engine on a short term basis, although eventually it may result in problems arising from excessive lead in the fuel. Engine manufacturers have safety information available on this problem.

To assure correct fueling the various fuels are color-coded. Pilots who make it their business to stand by the aircraft during the fueling operation thus can tell at a glance whether they are getting the correct fuel—even if the truck or pump happens to be mislabelled.

Another opportunity to double check the fueling occurs when the pilot is given an invoice by the fuel supplier. It should be read carefully. Otherwise you may be signing your death warrant.

Finally, during the preflight inspection, draining an adequate sample of fuel from each of the aircraft's fuel sumps gives the pilot still another

chance to make sure the fuel on board is appropriate.

Nevertheless misfueling does occur, and not always to inexperienced pilots either. Consider the following recent example from the files of the National Transportation Safety Board.

On June 20, 1984, a Cessna 340 landed at Lunken Field, Cincinnati at noon to pick up two passengers. The commercial pilot, who had logged over 1,900 hours, radioed ahead to a fixed base operator for fuel, indicating that he was on a quick turn-around. While the pilot located his passengers the twin-engine piston airplane was fueled with 61.6 gallons of Jet A.

The C-340 lifted off 21 minutes after arriving. Shortly after takeoff the pilot radioed that he had serious problems and was returning to the field. He was cleared to land on the same runway from which he had departed. However, the airplane stalled and crashed into a densely wooded area about two miles south of the airport. Fire erupted after impact. There were no survivors.

According to the NTSB official report, the fuel supplier understood the pilot to call for jet fuel, and therefore dispatched a jet supply truck to the ramp. The two linemen who pumped jet fuel to the engines each told investigators they saw the word "TURBO" painted on the cowling. (Turbo, of course, means *turbo-charged*—not turbine powered.)

A witness informed the NTSB that on a previous flight he had heard the C-340 pilot radio ahead asking for "just fuel."

One of the linemen told investigators that when the pilot came back to the airplane after the refueling he walked over to the fuel truck and used its sideview mirror to adjust a contact lens. The pilot then signed for the fuel on a credit card invoice which contained the words "Jet A." None of the witnesses reported seeing the pilot perform a preflight inspection of the sumps.

The NTSB investigators found no circumstances which might have contributed to the accident other than the presence of Jet A fuel in the tanks. The probable cause also cited *inadequate preflight, unclear phraseology and inattention to fueling.*

This unfortunate accident points up the fact that no matter how redundant the safeguards appear to be, none of them should be slighted or omitted. To begin with, the exact type of fuel desired should be spelled out—i.e., "One hundred low lead Avgas" or, alternately, "Jet A fuel." If you want both tanks, or all four tanks topped, you should say so, not just assume the fuel operator will know how many tanks there are in your airplane and how you want the fuel distributed.

Unattended aircraft left at fuel ramp have greater risk of being misfueled.

Secondly, you should make an effort to be present during the fueling, to forestall any possible mixup about your needs and what you are getting. If you cannot be there at the time, you can still take a moment afterwards to open a tank port and see whether the tank has been topped and whether the color of the fuel looks right.

If you check all tanks you will not be misled by the traditionally unreliable panel fuel gauge. If you have a highwing airplane and there is no ladder available, you still have a chance to check the fuel color when you drain the tank sumps to check for water or other contaminants. (Water can sometimes condense in the supplier's tanks, as well as in your airplane. Ideally, allow an hour after fueling for the new fuel to mix with the old and the water, if present, to settle down to the sumps.)

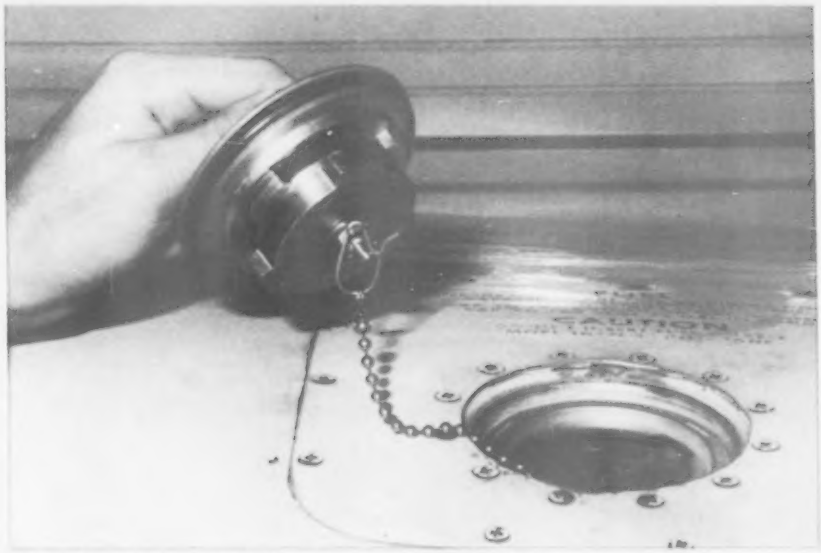
Alertness for water in the fuel is a cold weather must, as well as a wet weather concern—especially in aircraft where the fuel lines are vulnerable to freezing up. No matter how nippy the weather, it is worth while to examine the drained fuel—not just release an undetermined quantity from the warmth of the cockpit. The pilot of a Mooney M20F learned this lesson the hard way after a recent accident near Anniston, AL.

With one passenger on board, the 1,300 hour pilot had just refueled at Anniston and taken off for Conway, AR. After an uneventful climbout he leveled off at 8,000 feet in a cruise configuration. Abruptly the engine lost power and finally stopped. Attempts at restart were unsuccessful, so he made an emergency landing in a farm field under gusty wind conditions, which led to the wing impacting a tree before coming to a halt. The pilot was unhurt, although his passenger experienced a minor injury.

FUEL COLOR CODING

AVIATION GASOLINE GRADES			AVIATION TURBINE FUELS		
PRODUCT	FUEL DYE	HOSE BANDING	PRODUCT	FUEL DYE	HOSE BANDING
AVGAS 115	PURPLE	1-PURPLE	JET A (Kerosene-40°F)	straw or colorless	1-BLACK
AVGAS 100	GREEN	1-GREEN			
AVGAS 100-LL	BLUE	1-BLUE	JET A-1 (Kerosene-53°F)	" "	2-BLACK
AVGAS 80	RED	1-RED	JET B (Gasoline-Kerosene)	" "	3-YELLOW
MOGAS *					

* Pending later action, auto gas is not color coded. It is described according to grade/type and octane rating, e.g., "Mogas unleaded regular (87 octane)," or "Mogas unleaded premium (91 octane)," etc.



Gas tank restrictor kit blocks out oversized spouts on jet fuel nozzles.

The pilot later told NTSB investigators that he had released fuel from both sumps after refueling by using the strainer pull-handle in the cockpit. The temperature outside was 52°F. but because of the gusty wind the chill factor was in the low 30's.

The NTSB report found no discrepancies of any kind in the airplane except for water in some sections of the fuel systems. The aircraft flight manual noted that freezing temperatures were common above 8,000 feet and if encountered with water in the lines would result in ice formation and consequently fuel starvation. At the time of the accident the local temperature at 8,000 feet was estimated to be 28°F. Once again, the probable cause findings cited *inadequate preflight check*, as well as *frozen fuel lines* and *fuel starvation*.

Pilots seldom expect to find any problems with the fuel supplied by a reputable dealer, and in general their confidence is justified—but the capabilities of the fixed base operator should not be taken for granted. Pilots sometimes mislead themselves by imagining that line attendants are all grizzled veterans who have flown or tinkered with anything and everything flyable—and therefore no pilot oversight is necessary during refueling. Or if the line attendant is obviously not a grizzled veteran but a beardless boy or teenage girl, the pilot may imagine that youth as an avid aviation buff who has boned up on the subject of fueling operations in every spare moment.

The truth, of course, is that in these days grizzled flight veterans in fixed base operation, if they are no longer flying, are apt to be found in some back office wrestling with the intricacies of a word processor or computer. Similarly, line personnel found on airport ramps at weekends may not all be aviation buffs. Some may be college youths getting a little fresh air while helping to stretch the family budget—or recent immigrants for whom this kind of work is attractive primarily because it does not make a heavy demand on their command of language. In other words, it is an entry level kind of job, with a consistently high turnover.

On the other side of the fence, there is a tendency among some linemen to disassociate themselves from any responsibility for correct fueling. *If the pilot calls for jet fuel, you give him jet fuel, even if he taxis up in a Wright Flyer. The pilot, after all, is in charge; he is probably a professional and knows exactly what he is doing. Right?*

The truth is that pilots are not only professionals but also are doctors, lawyers, accountants, bootmakers, etc., who fly occasionally when time permits; who are often in a hurry; and who sometimes make mistakes. Fixed base operators have reason to be aware of the current willingness of courts of law to allow liability claims in accidents where no negligence is evident, but where an opportunity to prevent harm presented itself, and was ignored. The short time required to teach newcomers the difference between turbine and piston-powered aircraft is a good investment.

Although FAA has published recommended training and operating procedures for fuel handling at airports, the agency has stopped short of regulatory control. However, in recent years the National Air Transportation Association (NATA), in cooperation with FAA, the petroleum industry and numerous airport and airline executives, has put together training course for line supervisors which seeks to standardize many fueling practices.

The seminar not only provides a uniform type of training for the recognizably mobile line personnel, but also offers supervisors a wealth of information on the causes and prevention of misfueling, fuel contamination, leakage, fire hazards, etc. For information on attending the course, which is held frequently in various sections of the country, contact NATA at 4226 King Street; Alexandria, VA 22302; telephone number 703-845-9000. Also recommended is FAA's Advisory Circular 150/5230-4, "Aircraft Fuel Storage, Hauling and Dispensing," available free from the Department of Transportation, M-494.3, Washington, D.C. 20540. Concerned airmen and fixed base operators may take action in their own behalf by joining the campaign to impose a "mechancial lockout" between jet fuel nozzles and piston-driven aircraft fuel tanks. For the airman this consists of a gas tank restrictor ring kit, which reduces the filler neck down to less than 2.5 inches. For the FBO there is an oversized spout which attaches to jet fuel nozzles, increasing their diameter to more than 2.5 inches. The spouts are readily available from aircraft/aircraft parts dealers.

Most of these kits do not require installation by a mechanic. The aircraft restrictor kit consists of a replacement cap and a ring which is simply locked in place by the pilot or owner, using a special tool which is provided. The kits may be bought from FBO's and aircraft/parts dealers throughout the country. Care must be taken to provide the exact model and serial number of the aircraft, as there are two basic types of restrictor rings and these have some variations. Almost all pre-1985 U.S. general aviation piston driven aircraft may be thus retrofitted—in most cases there is no requirement for a logbook entry or mechanic's signoff. (Most 1985 aircraft have filler openings designed to lock out jet nozzles.) The cost of the basic restrictor kit is about $35 to $40.

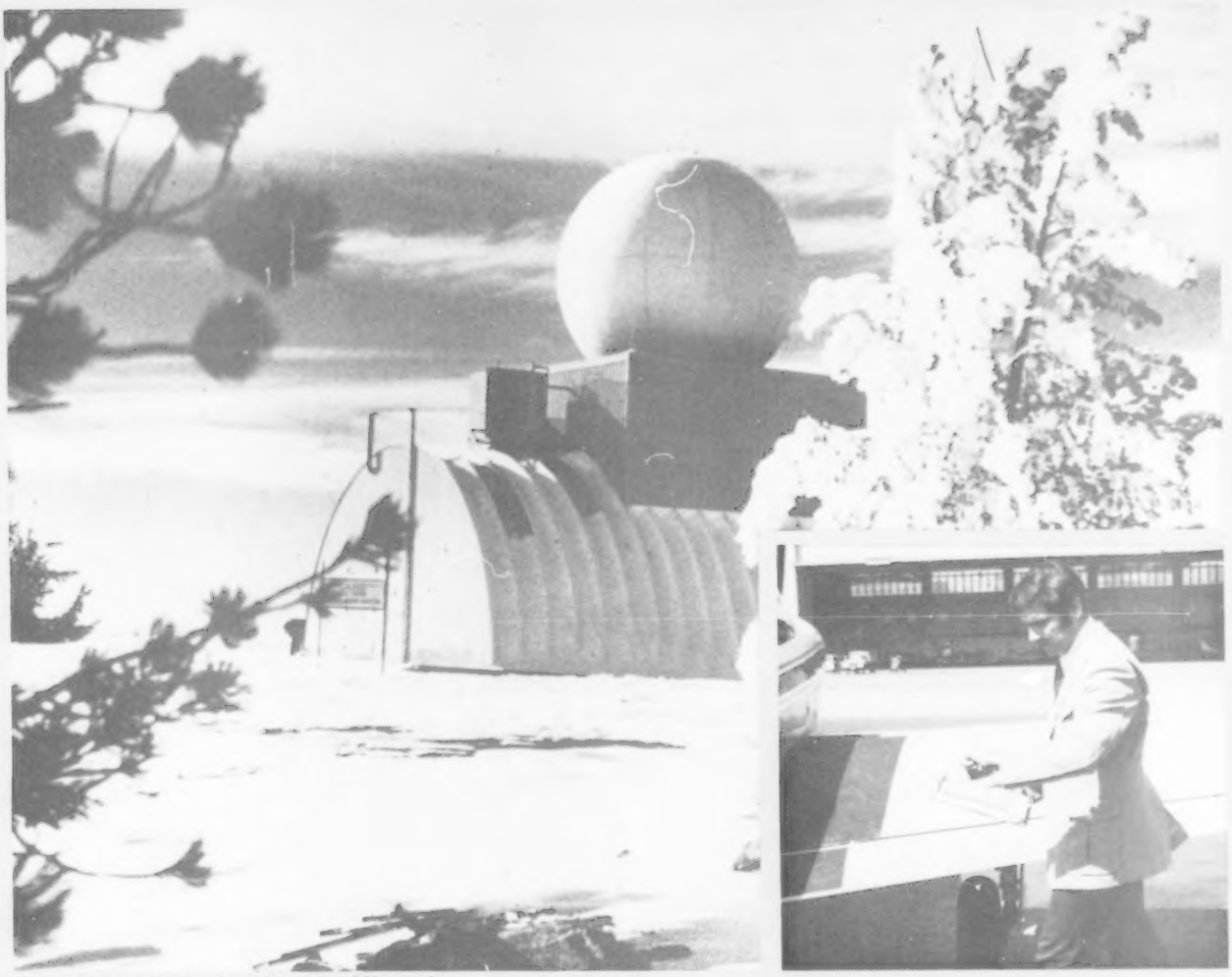
Caution: for complete safety, both pieces of hardware are necessary. The restrictor rings will not lock out some jet fuel nozzles if these are not fitted with oversize spouts, and the oversized jet nozzles will fit into many Avgas tank filler necks that are not retrofitted.

The industry-wide retrofit campaign was launched in August of 1984, spearheaded by the General Aviation Manufacturers Association (GAMA).

The United States Aircraft Insurance Group (USAIG), in support of this program, has been providing free equipment (or reimbursement) to a person or to organizations who are policy holders. The insurance group estimates that approximately only 10% of the general aviation fleet has been retrofitted with restrictor kits while over 50% of the nation's FBO's have installed the oversized spouts on their jet fuel nozzles.

Also approved by FAA is a series of color-coded decals, designed by GAMA, which may be attached to the aircraft. A black and white decal indicates jet fuel; the Avgas decals coincide with the dye color of the appropriate grade of fuel. Information on the decals must not conflict with or displace any FAA-required filler markings or information. To purchase decals at $1.00 each, send a check to GAMA, Suite 801, 1400 K Street; Washington, DC, N.W., 20005.

Efforts are also under way to make installation of similar color coded labels on fueling hoses a standard procedure. Once again, this may sound like a redundancy of safeguards, but the cost is slight if it helps us eradicate the misfueling accident completely.



Weather service radar site near Missoula

BRIEFING FOR WINTER FLIGHTS

"Self briefing" is a term that currently suggests some kind of automated weather information source, such as an automated flight service station, IVRS (Interim Voice Response System), DUAT (Direct Users Access Terminal), televised "Aviation Weather," etc. All of these have their advantages, but one thing you cannot do with an automated briefing is talk about your flight experience and qualifications and be advised as to which routes, if any, you could fly safely, considering the prevailing and forecast weather.

Even if you put this question to a live briefer, the final decision would be up to you as pilot in command. Many pilots are over-optimistic in making that decision on their own, because they are unable to visualize how the various observations and forecasts are likely to affect their flight conditions—especially in early winter, when the hazards of snow and ice are not close to mind. Overly eager pilots may hear only what they want to hear and disregard the remaining portions of the briefing. They may also pay the price for their impulsiveness by encountering serious weather problems en route.

One way to avoid uncertainty or unwarranted optimism about the weather is the kind of preliminary self-briefing sometimes known as the "Big Picture" technique. The pilot looks over the reports and observations available to him and comes to a conclusion as to what general kind of weather phenomena will dominate the airspace he would like to fly through. If the primary conditions—temperature, moisture, stability of air, and clouds—are clearly favorable over a broad area adjoining the intended flight, the pilot then proceeds with planning out the stage by stage details of the flight.

If the primary conditions are *un*favorable, there is no point in going on to look for a preferred route—unless there is an actual emergency requiring the flight. Weather forecasting is not an exact science, because meteorologists cannot tell you exactly what kind of weather conditions will occur at any given point and time; but on the other hand meteorology involves many precise measurements and readings, which permit general predictions about the weather to be made.

Observations along the en route sectors are not made, except for scattered PIREPs. Freezing levels may be close to or at the surface. Loss of

visibility and lowering of ceilings occur very rapidly during snow shower activity.

For example, on the basis of Weather Service reports the pilot can look at the configuration of the major air masses that overlay the country—the polar air masses that flow out of the colder regions in the north and the tropical air masses that originate in the southerly latitudes.

The atmosphere is in constant motion, of course, but there are large regions, especially in winter, where the air is relatively stagnant for a number of days, and is fairly uniform as regards temperature, moisture, stability, etc. for hundreds, sometimes even thousands of miles. A polar air mass, encountered in a region where it is being cooled from below by a frozen or snow-covered surface, is largely composed of cool, dry, stable air—a pilot's delight. Where the polar air mass extends over open bodies of water or mountainous terrain, these properties will be modified to some degree (see Figure 1).

When a winter polar air mass lies over the Great Plains area east of the Rockies, we can expect generally clear skies, unlimited ceilings, excellent visibility and smooth flying. But a polar air mass that has passed to the southeast of the Great Lakes, or has moved down the coastal areas, should lead us to anticipate clouds, low ceilings, precipitation, icing, and turbulence.

If we will be flying through *tropical* air masses in winter in the United States we may expect some clouds (stratus or stratocumulus) and low ceilings, but little or no precipitation and smooth air.

Between the polar and tropical air masses there is a continuous transition, or frontal area, which encircles the globe (Figure 2). In some portions of this zone there is a gradual transition of temperature as a result of terrain features or terrestrial circulation. In other portions there is considerable frontal activity, resulting in turbulence, cloud buildups, icing and precipitation. Using weather service information, a pilot can identify the kind of air mass, or transition area, which will dominate his flight path. He will then be able to make an initial determination as to whether the flight is advisable—before getting down to the precise details of routes, altitudes, alternates, etc.

Another kind of "big picture" technique for prebriefing consists of weighing the four dominant factors of flying weather which can be observed or reported for the area of intended flight. These are: temperature, humidity, stability and clouds. The presence of cumulous clouds indicates up and down drafts at work; stratus clouds signify the absence of atmospheric lift. Warmth can provide the lifting force for the updrafts that clump moist air into clouds. Dry, cold air means no clouds, or storms, although some turbulence could be present if there are strong winds and terrain obstacles.

Cloud terminology is a burden for some pilots, although basically there are only two kinds of clouds: cumulus and stratus. Cumulus are the round, puffy clouds formed by updrafts; they always signify some degree of turbulence, and they may develop into a raincloud (cumulonimbus) or a thunderstorm. The darker the cloud, the more water present and the more potential storm energy.

Stratus clouds are layered formations, extended parallel to the horizon by terrestial circulation; they indicate smooth air, or the absence of lift.

Eventually, automated weather briefing stations will have enough access to each pilot's flying background to be able to provide individually tailored weather briefings. In the meanwhile pilots may find it useful to focus on the basic building blocks of weather before becoming immersed in the details.

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Figure 1.

WINTER FLYING CONDITIONS IN VARIOUS AIR MASS TYPES

Air Mass*	Clouds +	Ceilings	Visibilities	Turbulence	Surface Temp. °F
cP (near source region)	None	Unlimited	Excellent (except near industrial areas, then 1 to 4 miles)	Smooth except with high wind velocities	–10 to –60
cP (SE of Great Lakes)	Stratocumulus and cumulus, tops 7000 to 10,000 ft.	500 to 1000 ft., 0 over mountains	1 to 5 miles, 0 in snow flurries	Moderate turbulence to 10,000′	0 to 20
mP (on Pacific Coast)	Cumulus, tops above 20,000′	1000 to 3000 ft., 0 over mountains	Good except 0 over mountains and in showers	Moderate to severe turbulence	45 to 55
mP (E of Rockies)	None	Unlimited	Excellent except near industrial areas, then 1 to 4 miles	Smooth except in levels with high winds	30 to 40
mP (E Coast)	Stratocumulus and stratus, tops 6000 to 8000 ft.	0 to 1000′	Fair except 0 in precipitation area	Rough in lower levels	30 to 40
mT (Pacific Coast)	Stratus or stratocumulus	500 to 1500′	Good	Smooth	55 to 60
mT (E of Rockies)	Stratus or stratocumulus	100 to 1500′	Good	Smooth	60 to 70

* Air masses are of two principle types *polar* (P) and *tropical* (T), and further classified by differing moisture content into maritime (m) and continental (c).

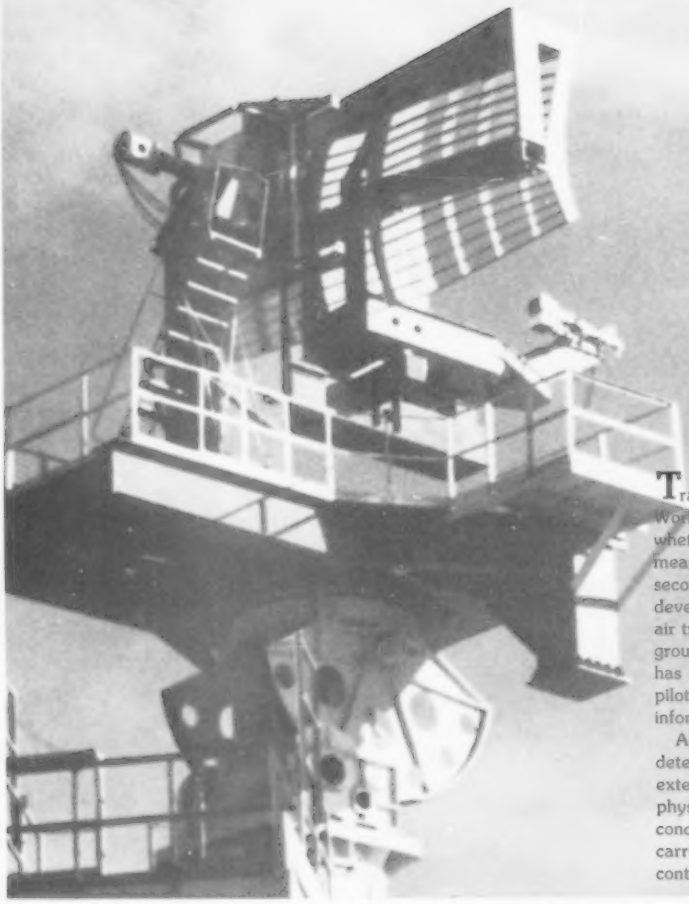
\+ Inflight icing conditions should be anticipated in clouds or precipitation with subfreezing temperature.

THE POLAR AIR MASS

Classical weather pattern in winter (looking down on North Pole) as outflow of cold air produces cold fronts along a globular transition zone (slashed area).

Friend or Foe

The Importance Of Transponder Care And Maintenance



Transponders were developed during the air defense of Great Britain in World War II as a means of enabling radar operators to quickly determine whether a radar target was "friend or foe." This was accomplished by means of an airborne radar transceiver which could be interrogated by a secondary or "Beacon" radar system on the ground. With additional development this instrument has become one of the key components in the air traffic control system for separating aircraft from other traffic and from ground obstructions, as well as for locating lost airmen. However, while it has been a true friend to pilots in need, the transponder can also be the pilot's worst enemy if it is neglected and allowed to transmit erroneous information.

Although internally mounted in the aircraft, the transponder is subject to deterioration from vibration, heat, dampness and just plain wear. The externally mounted antenna and co-axial cable are also vulnerable to physical damage. Preventative maintenance consists of monitoring the condition of the antenna and cable, assuring that required inspections are carried out on schedule, and assuring that panel read out data coincide with controller information. Understanding a few details about the transponder

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and its role in air traffic safety may help pilots make sure that it remains a dependable ally.

Just what exactly is a transponder, anyway? Let's start with Webster's definition—"Transponder: A radio or radar set that upon receiving a designated signal emits a radio signal of its own."

The airborne unit consists of a receiver, which picks up ground interrogator transmissions on 1030 MHz; a transmitter which sends replies back to the ground facility on 1090 MHz; and electronic circuits necessary to format digital reply codes for the identification and altitude data originating in the aircraft.

The transponder also incorporates a feature called IDENT. When the IDENT button on the transponder is pushed, a special pulse is transmitted during each reply for a period of several seconds. When this pulse is received and decoded at the ATC facility, a special IDENT annunciation is displayed next to the target representing your aircraft on the controller's display. This feature allows the controller to positively identify your aircraft for proper tracking.

The transponder can only send one group of data during each reply. For this reason, the interrogator must either send a coded message to the transponder saying "please reply with your assigned code" (for aircraft identification) or "please reply with your altitude." The transponder recognizes these messages as Mode 3/A, or Mode C (altitude encoding) interrogations.

The encoding altimeter is a standard altimeter which senses the pressure altitude of the aircraft (as displayed by the panel altimeter) and converts it to an equivalent digital signal which is sent to the transponder. Each time an altitude change of 100 feet or more occurs, the encoder signal changes to reflect the new altitude.

The aircraft may, alternately, be equipped with a "blind" altitude encoder, which senses barometric pressure separately from the panel instrument. Both types of encoders are always referenced to 29.92 inches of mercury. When the transponder transmits the altitude data, and it is received and decoded at the ATC facility, a barometric correction is automatically applied to the data for use by the controller.

The transponder is connected via coax cable to a small antenna usually located on the underside of the fuselage. If an encoding altimeter or blind encoder is installed, that device will be connected to the transponder via a multiconductor cable on the ground; the signal received from the transponder is decoded and fed to data processing equipment located at the air traffic control facility. The processed data is ultimately displayed on the controller's screen.

Now that we have seen how the system works, basically, let's discuss the pilot's responsibilities toward operating and properly maintaining a transponder system. Here's what the Federal Aviation Regulations (FAR) say about these responsibilities.

- **FAR § 91.24** has a recent change which states that the aircraft is equipped with an operable transponder (and altitude reporting equipment, if installed), the instrument must be *on* and set to reply on the appropriate code when you are flying in controlled airspace. This rule also states that aircraft flying in Terminal Control Areas (TCA's) and all controlled airspace above 12,500 feet, must be equipped with a transponder and automatic altitude reporting equipment.
- **FAR § 91.36** states that ATC can direct you *not* to use your altitude reporting equipment under certain circumstances. If the controller believes that the altitude data he is receiving is in error, you will be asked to set the transponder to reply only to Mode 3/A (the four digit assigned code). This rule also states that the altitude reporting equipment connected to the transponder must agree within 125 feet of the indicated altitude displayed on the altimeter used to maintain flight altitude. (This is referred to as data correspondence.)
- **FAR § 91.171** tells us that the static pressure system as well as each altimeter and automatic altitude reporting system must be inspected and tested every 24 calendar months. If any maintenance is performed on the integrated system (altitude reporting unit and transponder) which could produce an altitude data correspondence error, the entire system must be tested and inspected. All of the test and inspection requirements stated in this rule are contained in Appendix E and F of FAR Part 43.
- **FAR § 91.172** tells us that the transponder must be inspected and tested every 24 calendar months in compliance with Appendix F of FAR Part 43.

Pilots and maintenance technicians should review these rules in their entirety, since they were only highlighted for the purpose of our discussion. Some pilots may not be familiar with FAR Part 43, which deals with maintenance, preventive maintenance, rebuilding, and alteration. A review of FAR Part 43, especially Appendix E and F, will give you an appreciation of the steps necessary to test and inspect your altitude reporting system, as well as the static pressure system it is connected to and the transponder itself. This will give you some idea of how complex these systems really are.

Why do we need these maintenance rules? Their objective is to detect any malfunction or degradation of performance *before* flight safety is affected. The transponder system may appear to be working fine when in fact it may be operating right at the tolerance limits of the equipment. If so, it is only a matter of time before the system no longer functions properly.

You might ask, "How is a malfunctioning transponder going to affect how safe my airplane flies?" A malfunctioning transponder could cause your aircraft, as well as other aircraft in the vicinity, to be put in a hazardous situation. Let's assume you are flying in IFR conditions and you enter a TCA or any airspace where numerous other aircraft are flying. If your transponder malfunctions, the air traffic controller may not be able to properly identify or consistently track your aircraft. As a result, the controller may be unable to provide adequate separation between you and other traffic without additional vectoring or holding.

Even if you are flying without voice communications with ATC, there is a great deal of airspace where your transponder (if turned on) makes you observable by controllers, who may use your radar return to help provide a safe and efficient traffic flow. A transponder malfunction could prevent ATC from correctly tracking your aircraft. Certain malfunctions could result in your being displayed in an erroneous position or at an erroneous altitude. The controller could, unknowingly, route traffic away from your *displayed position* but *toward your actual position*, as a result of the error.

Beacon (transponder interrogating) radar is an integral part of the air traffic system and has become the prinicipal means of tracking and controlling aircraft. While nearly all airspace is monitored by primary radar as well, aircraft detection by primary radar may be impaired by weather, ground features, small aircraft size, and distance from the antenna. These conditions have little or no effect on transponder returns. The IDENT feature of Beacon radar also speeds up radar contact on a busy scope with its enlarged return.

Now let's discuss another potential problem. Assume you are flying in IFR conditions and your transponder is set for Mode C operation. Let's further assume that your altitude encoder malfunctions and causes erroneous altitude information to be sent to the controller. Based on that altitude information, the controller will have a difficult time providing proper vertical separation between you and other aircraft. If the controller believes that the altitude you are reporting is suspect, you may be asked to reset your transponder to Mode 3/A (identification only). This condition could be particularly hazardous when approaching or departing a busy airport.

No matter how many changes or improvements are made to the radar equipment, the system will not function as advertised unless your transponder and altitude reporting equipment are fully operational. It is for this reason that the FAA rules we discussed earlier were written.

A recent FAA study has indicated that erroneous general aviation transponders contribute significantly to aircraft tracking problems in the National Airspace System. A number of these problems are related to maintenance of the transponder system. Many of the near-miss encounters reported to FAA have involved transponder problems. The importance of properly maintaining your transponder system cannot be overemphasized.

There are a few simple pilot procedures which should minimize problems with your system.

1. Include a check of your transponder antenna as part of your pre-flight inspection—check the antenna for attachment security and any visual deformation.

2. While flying, make it a point to ask ATC what altitude your equipment is reporting, and compare the reported altitude with your panel altimeter. If the discrepancy is more than 125 feet, the system needs maintenance.

3. Be alert if a controller reports problems with your return. Occasionally the aircraft attitude or altitude can temporarily prevent a response. But if the controller continues to have difficulty, or if more than on controller or ATC facility reports the difficulty, again, your transponder needs attention.

An ailing transponder is a friend in need—of help. Don't neglect it.

This article was prepared by Robert Watson, Aircraft Maintenance Division, Flight Standards.

Logging Time on the Ground

Logging Flight Time—a dialogue between a flight instructor and an FAA headquarters certification specialist.

Instructor: While perusing back copies of the *FAA General Aviation News* I noticed in the Jan/Feb 1984 issue a letter on the Flight Forum page about pilot ground trainer time. The writer asked whether an instrument rated pilot could log for currency the time spent in an approved instrument "simulator" (ground trainer) as sole operator (not receiving instruction from a flight or ground instructor). You replied in the affirmative, which puzzles me greatly. What is the regulatory reference for this interpretation?

FAA Specialist: The reference is FAR §61.51 which governs the logging of pilot time. You are correct in pointing out what I believe was a mix-up of words in that letter and reply. The only pilot ground trainer time creditable is pilot ground trainer *instruction*, which must be certified by an appropriately rated and certificated instructor, from whom it was received.

Instructor: Okay. But your answer to that Forum letter also indicated time spent in a ground trainer or simulator can be included in your *total flight time*. Isn't that a mistake? I have questioned local experts about this, and have been told that ground trainer time cannot be logged as part of total time because the latter refers to, and is applicable only to, flight in an aircraft. In the logbooks I endorse I always insist that ground trainer instruction be clearly differentiated from aircraft instruction time.

FAA Specialist: Pilot ground trainer instruction time may only be logged for what it is—instruction in a ground training device. However, some ground trainer instruction time, when properly certified by an appropriate instructor, is also creditable toward the total flight time required for certificates or ratings under Part 61, as well as toward the currency requirements of an instrument rating. The ground trainer instruction time creditable toward the total flight time may not, of course, exceed the specific number of hours authorized by the regulation, such as, for example, the 20 hours allowed toward the instrument rating.

Instructor: What about the safety pilot who accompanies an instrument-rated pilot in an airplane during simulated instrument conditions, when no instruction is being given—is the safety pilot expected to sign the logbook entry for this time?

FAA Inspector: No, but to validate the flight for currency the pilot logging the time is expected to provide the safety pilot's name, along with the date and the circumstances of the flight.

Instructor: Let's go back to ground trainer instruction for a minute. How does an instructor enter that time in his, or her, own logbook?

FAA Specialist: Only the instruction given within the limits of the instructor's certificate should be logged (61.189). Incidentally, there is no actual requirement for a *ground* instructor to log instruction given—except to show the recent experience time called for under Section 143.19. However, in the interests of professional ethics a reliable record should be maintained of all instruction given. It may be needed to validate training or qualification credits.

Instructor: Agreed. Incidentally, is there a difference between what is called a "ground trainer" and a "simulator," and if so how may they be identified?

FAA Specialist: A simulator is "a device which duplicates a specific aircraft's cockpit and is capable of closely representing the actual aircraft through various ground and flight regimes." Simulators must be evaluated and approved by FAA, in accordance with published criteria. For airplanes, these criteria are contained in Advisory Circular 120-40 (1-11-83). Simulators are generally, but not entirely, applicable to Part 121 aircraft.

As the AC notes, any device which does not meet the simulator provisions may be considered a ground training device. These must also be evaluated and approved by FAA for specific purposes of instruction. The criteria used to make these determinations are too complex to be presented in this discussion. If there is enough interest we can have a later talk about the various types of pilot ground training devices in current use, and the purposes they may serve.

Instructor: Fair enough. In the meantime, in the interest of assisting pilots and instructors, does FAA or its field offices issue a list of approved ground training devices?

FAA Specialist: There is no such list at the present time. Ground training devices are evaluated as they come on the market, usually by the field offices, in line with policy established at FAA Headquarters. If you have any doubt about the creditability of a trainer, check with your nearest Flight Standards District Office.

Paperwork and Aviation Safety

by John S. Kern

John S. Kern was a U.S. Army Aviator, rated as both a fixed-wing and rotorcraft pilot. After his tour in the Army he was employed as a pilot with Northwest Airlines before joining the FAA in 1970. He is presently Director of Flight Standards.

FAA's investigation of the national air transport industry (NATI) and the follow-up general aviation safety audit (GASA) disclosed a surprising number of unsatisfactory practices, and has led to a policy of more frequent agency inspection in most segments of aviation. A high percentage of errors, however, turned out to be errors of *omission*—notably in the area of record keeping. Failure to provide or abide by procedures for record keeping, rather than physical or mental errors on the part of pilots, maintenance technicians, and managers, was the basic problem.

The expression, "only a paper error," suggests that such mistakes are of no great consequence, but that is certainly not true in aviation today. In many cases records *are* the safety system.

At one time—many, many years ago—aviation involved so few machines and airmen that the structure of rules and approved procedures was simple enough to be committed to memory. Aircraft engines and other components were far less complex and the industry was not the global one we find today. We now have in this country over 260,000 active aircraft with a great variation in design, and something like a million persons engaged in flight operations and aviation maintenance. Consequently, the safety of flying depends very much on information committed to paper.

Our willingness to possess or apply this data appropriately has enabled us to steadily improve flight safety and reduce accidents. Aviation can continue to grow safely only if we all recognize the importance of the written word as a precise guide, and as a reminder of what has to be done to safeguard aviation standards. Your best safety system is, in fact, your records system and what you learn from it.

Flying is an activity in which the margin for error is small, and the penalty of error often severe. Airmen are an exceptionally capable segment of the population, but if we all had to learn from our own errors, our accident toll would still be as frightening as it was in the very early days of aviation. Thankfully we do not have to learn from our own or each other's errors anymore. Appropriate techniques and procedures for flying and maintaining aircraft with a minimal chance of accident have been transmuted into rules, approved procedures, airworthiness directives, advisory circulars, etc., which cover all phases of flying, from startup to shutdown, for gliders and widebody jets, and for every type of pilot and technician.

These fundamental concepts are taught and practiced in the early stages of flight and airworthiness training, and are essential for safe advancement in either field. In time some of us may lose sight of their vital important—unless they are highlighted and promoted periodically. This is why the "Back to Basics" thrust of our Accident Prevention Program is so important.

We in Flight Standards are concerned about the fact that in our recent industry inspection we found numerous instances of operators disregarding certain kinds of paperwork. For example, in some FAR Part 145 (air carrier and some large aircraft) repair stations, inspectors found that calibration records for special tools and test equipment were nonexistent or past due for calibration. This may not sound like an important item, but it is. For example, suppose a torque wrench became defective over a period of time and indicated a lower torque value then what was actually applied. As a consequence, a bolt might be overtightened and possibly crack internally, leading to an inflight structural failure and a serious accident. Many aircraft components are simply too sensitive to be adjusted by tools or instruments which are not regularly calibrated.

Annual inspections are another case in point. Admittedly there is nothing magic about 12 months as a period after which an aircraft's components may start to fail, but experience has taught us that this time period appears to be effective, and that pilots who fly in aircraft which are out of annual have a greater risk of experiencing mechanical failure than those who do not.

We live in an age when the ever-increasing flow of paper information seems to provoke some rebellious reactions, but there is no place for that kind of attitude in flying. Recently I heard about a pilot who disregarded nearly a dozen important regulations or recommended procedures in one flight—a student pilot with fewer than 35 hours of certified instruction. He was not authorized for cross-country flying. Nevertheless he set out in a *Taylorcraft* on a wintry morning in Maine for a fishing trip in a sparsely settled area upstate, with a non-pilot passenger on board.

The 30-year old tailwheel airplane was nearly two years out of annual, had undergone an engine change and a ski landing gear installation for which there was no supplementary type certificate or log entry, and was fueled with auto gas without benefit of an STC. There was no ELT on board. Gross weight at takeoff was estimated to be 175 lbs. in excess of the limit. The airplane lifted off approximately 800 feet down the 1600 foot airstrip, and a right turn was initiated at an altitude of about 45 feet AGL. Shortly afterwards the engine stopped and the airplane crashed in a nearly nose down attitude in a clump of woods. The wreckage was not located until two days later.

Unfortunately the pilot did not learn from this experience, because he did not survive—his passenger was seriously injured. Some people who appear to be model, law-abiding citizens, who might never cross a street except at approved intersections, will sometimes disregard the most basic, common sense provisions for flight safety. Perhaps this is because flying is such an exciting activity, but that is no excuse: you can have all the excitement in the air you wish without busting a single regulation or ignoring a single approved practice.

Incidentally, this same *Taylorcraft* pilot had purchased the aircraft and, according to the NTSB investigation, had learned to fly "on his own" (i.e. with the help of obliging, but misguided, friends). One of his recovered logbooks showed a total of 66.8 hours of "training," "practice," and "cross-country," over a period of 15 months *prior* to his first dual lesson logged with a certificated flight instructor.

This kind of knowledge is dangerous. In fact, we in Flight Standards believe that all flight training is best given with a certain degree of formal structuring, so that the novice pilot moves up stage by stage, as a result of demonstrated flying ability and flight attitude—and not by leaps and bounds, simply as a consequence of inherent ability or intelligence. Our recent general aviation safety audit indicated to us that there is a need to encourage a more formalized approach to instruction, and we hope to get that word out to certificated instructors involved in other than certificated pilot schools.

We would also like to impress upon each individual airman, pilot and maintenance technician alike, the importance of an attitude which says, "Everything about flying is important. There are no 'mere formalities'."

In these days when general aviation operating costs have increased across the board, it may come as no surprise that you might have to pay as much as $100 an hour for the four to five hours of dual instruction you will need in order to qualify in a high performance airplane. But "per hour" could be a deceptive term, since the time charges usually begin as soon as the oil pressure gauge is activated, and in turn activates the Hobbs meter. Time spent in the cockpit with the prop spinning while the instructor is going over various intricacies of the airplane can easily add up to 20 or 30 minutes per trip. You can shave down this additional expense by taking time to become acquainted with the airplane on your own, in advance.

We are not talking here about a practical test for an initial certificate or an additional rating or category (such as multi-engine, seaplane, etc.) We are talking about an already certificated and rated pilot who decides to move up to something a little faster or more complex. If the airplane of choice has more than 200 horsepower; or has retractable landing gear, flaps and a controllable pitch propeller, it is defined by the Federal Aviation Regulations as a "high performance" airplane.

FAR 61.31(e) states that no one may act as pilot in command of a high performance airplane unless he, or she, has received flight instruction from an authorized flight instructor and has been certified as competent. (This requirement is waived only if the pilot has logged flight time as pilot in command in high performance airplanes before November 1, 1973.)

How can a transitioning pilot keep the cost of a successful checkout down to a minimum? The key, in a word, is *the numbers*. Acquire the appropriate numbers and keep them at your fingertips.

There is something basically similar about flying all airplanes, but what differs significantly can usually be quantified. Any given airplane could have as many as a hundred unique numbers that correspond to such matters as airspeed for rotation, liftoff, climbout, best rate or angle of climb, cruise speed, never exceed speed, maneuvering speed, flaps down maximum speed, etc. This data is usually contained in the Pilot's Operating Handbook: it will help you immeasurably to get hold of one in advance. You should take the trouble to extract some of the operational numbers and commit them to *paper*—on 3 x 5 or larger cards, assembled in some manner (such as a clipboard) so that you can pull the numbers out quickly with one hand and read them in the cockpit environment.

As a certificated pilot you have already absorbed at least one set of flying habits and numbers keyed to a given airplane. You will have an unconscious tendency to apply the learning to the more sophisticated airplane you are now adapting to. The checkout instructor, when present, should be able to prevent this carryover of prior knowledge from taking place in a harmful manner; but this could delay your certification. Once you are alone you will need to have quick access to written guidelines at all times, until the new information also becomes a habit.

Committing the numbers to memory during a short training period is not practical and leads to mistakes. There is always a tendency to apply old knowledge to the new situation; and in a high performance airplane an airspeed difference of only a few miles per hour, at a critical phase of flight, could spell disaster. Checklists for procedures leading to various segments of flight also tend to carry over from one airplane to another, in the pilot's mind; these too should be on paper at your fingertips, as well as all emergency procedures.

In point of fact, it would help considerably if you could read through the entire handbook while sitting in the cockpit of the airplane while on the ground, since the layout of the instrument panel, switches and control levers is by no means standardized. A hands-on familiarization, with the Handbook in your lap, is the best way to get to know where everything is. If the airplane is

SAMPLE INFORMATION CARD

Fuel _____ Quantity usable _____
Max takeoff G.W. _____lbs.
Basic Oper. wt. _____lbs.
V_{no} _____ (top of green arc)
V_{so} _____
Takeoff speed V_r _____ V_{lof} _____
V_x _____ V_y _____

V_a ___ Rough air penetration speed_____
V_{le} _____ V_{lo} _____
V_{fe} _____ 10° _____ 40° Landing wt._____

Cruise climb speed _____
Max MP Hg." Takeoff _____
Climb_____ Initial cruise _____
Max RPM for Takeoff_____
Climb_____ Initial cruise _____

Final approach speed
Soft field _____ Landing distance _____
Short field _____ Landing distance _____

not available for this exercise, use your imagination to visualize the location of the instruments and control levers and knobs. (The fixed base operator should be willing to lend you a copy of the Pilot's Operating Handbook for study purposes; otherwise contact a manufacturer's representative.)

There may be some fundamental differences in how various systems in the airplane you are moving up to work. See that you understand these in advance of your check rides—especially the emergency procedures. The landing gear extension, for example. Is it all-electric, or also hydraulic, and how do you accomplish the manual extension? Is there a failsafe device for preventing gear-up landings? Does this feature still function if the master switch is turned off (to simulate electrical failure)?

The engine may be very different from any powerplant you are familiar with. Is it carbureted or is it fuel injected? Turbocharged? In the latter case, can it be overboosted? If equipped with a controllable pitch propeller, what power settings are used for takeoff, climb, cruise and descent? How is the fuel system designed? What about the octane range and lead content of the Avgas? What is the hourly fuel consumption?

All of this is carefully explained in the Pilot's Operating Handbook, so there is little need to take up flight instruction time to go over such material, except as a review. You may also save yourself quite a bit of money if you study the takeoff and landing information found in the handbook so that you do not waste instruction time flying to an airport with unsuitable runways for your checkout. "High performance" often signifies a need for longer runways, especially in conditions of high density.

Also, if you are not in the habit of landing within the first one-third of the runway because there has been no need for such accuracy in the simple airplanes you have been flying, be prepared for the fact that your high performance airplane can gobble up real estate at an alarming rate—especially if your approach is a bit too steep or too fast. "High performance" brings you many advantages, but usually reduces the margin for error.

The real test may come after you have passed your checkout. Will you then consider yourself still on a learning curve, or will you assume that the instructor's sign-off in your logbook makes you a master of this high performance airplane? How long should you continue using written checklists and numbers cards? "Indefinitely," many experienced pilots say. This is especially true if you are flying a complex aircraft, or flying more than one kind of aircraft. The *variety* of your previous experience may be more important than the total time. If you have spent half a life time in one type of simple airplane, those ingrained flight habits are not going to die easily.

Accident records compiled by FAA and the National Transportation Safety Board suggest that time in type is a more critical safety factor in preventing accidents than overall time. When the "type" is a high performance airplane, the hours logged after solo certification may be doubly important.

The Safety Board publishes an Annual Review of aircraft accidents which includes a breakdown of general aviation accidents according to overall time and time in type. In recent years more than 30 percent of the pilots involved in accidents had less than 50 hours in type. Many of these pilots were heavily experienced in other aircraft, with total time ranging up to 10,000 hours. Pilots with 50 to 99 hours in type had less than half as many accidents annually (about 13 percent).

There is no legal requirement for dual instruction or a checkout if you decide to move *down*—i.e., transition from a high performance airplane to something simple—as is the case when an airline captain buys a light plane for personal use, or a commercial pilot decides to restore and fly an antique aircraft. Under these circumstances the pilot must assume responsibility for his or her own competence.

This kind of transition, however, is often much more difficult than it sounds; complex learning can be more difficult to unlearn, or put aside, than simple learning. This is difficult for some pilots to believe. The higher up the pyramid of aeronautical competence they have climbed, the more omnipotent they may feel about flying and the more likely they are to underestimate the hazards of flying simple airplanes. Such pride leads to many a hard fall, as the accident records readily substantiate.

The restraining factor here is that most fixed base operators will require a thorough checkout flight before renting any airplane to a pilot whose logbooks do not show recent experience in a similar make and model, regardless of how much experience or jet time may be claimed. And most insurance companies would be reluctant to write coverage for an airplane acquired by a pilot without appropriate experience in it.

There are always some pilots who manage to get around these restraints, and live to tell the tale, but in the long run it obviously pays to accept the limitations of human learning. Safe flying is definitely a learned behavior, not an inherent knowledge. ■

PILOTS BY TOTAL TIME AND TIME IN TYPE
ALL OPERATIONS

Total time (Hours)	Time in type (hours)								Pilots	
	1-49	50-99	100-499	500-999	1000-4999	5000-9999	10000 or more	0 or not reptd	No.	Percent
1-49	192	0	0	0	0	0	0	8	200	6.1
50-99	129	90	0	0	0	0	0	15	234	7.2
100-499	304	168	324	0	0	0	0	54	850	26.0
500-999	98	41	163	67	0	0	0	45	414	12.7
1000-4999	156	94	299	166	151	0	0	69	935	28.6
5000-9999	35	16	76	37	95	10	0	24	293	9.0
10000 or more	16	9	49	23	61	13	3	11	185	5.7
Zero or not reported	5	1	7	2	1	0	1	142	159	4.9
Pilots										
Number—	935	419	918	295	308	23	4	368	3270	
Percent—	28.6	12.8	28.1	9.0	9.4	0.7	0.1	11.3		

NOTE: The above information is from the NTSB's "Annual Review of Aircraft Accident Data, 1982."

A recent incident in northwestern Wyoming provides a good example of how easy it is for even a professional pilot to get caught in a situation where lack of a vital statistic on the airplane's performance can jeopardize safety. The pilot was an experienced instructor who was taking his family to Yellowstone National Park for a vacation in a rented Cessna 210. The pilot was in the habit of printing out the airspeed information for the various airplanes he instructed, for all possible conditions of flight, on 3 x 5 cards. He kept this data tucked away in his flight bag, since it would be difficult to memorize all the numbers. As it happened he had not instructed in the 210, so he had no card on this airplane. For this simple pleasure flight it seemed enough to just read over the basic information in the operating handbook.

As it happened, several problems developed as he was passing over Crazy Woman VOR, at a cruise altitude of 8,500 feet. A burning odor appeared in the cockpit and there was a strong burning smell in the instrument panel area. He immediately shut off the master switch and began a descent to the nearest airport—Johnson County at Buffalo, about 40 miles northwest. During the descent he began to encounter increasingly severe turbulence, and as he began to adjust his airspeed he realized that he did not know the rough air penetration speed for the 210. He was reluctant to change course to avoid the turbulence, in view of his apparent electrical problem. He estimated the proper speed to be 150 mph and continued on to Buffalo, where he was able to land without further incident.

Later he discovered that the maneuvering (Va) speed for his model 210 was 131 mph, and he took pains to examine the airframe very thoroughly for structural damage before continuing his flight—once the electrical problem had been attended to. He also provided himself with a data card for *all* the airspeeds of the rental plane.

A new feature at the EAA annual Oshkosh Convention and Fly-in this year was the FAA forum tent where pilot seminars were led by outstanding FAA safety experts, Accident Prevention Specialists, the Administrator, and the Federal Air Surgeon. Standing room only crowds, totalling over 7,000 attendees, packed the forum tent all week as pilots had an opportunity to attend 40 seminars that addressed numerous aviation safety topics.

OUTSTANDING FLIGHT INSTRUCTOR, MAINTENANCE TECHNICIAN CHOSEN

Howard William Siedlecki, 1986 outstanding Maintenance Technician of the Year, was only two years old when his family escaped from Nazi-occupied Poland, at the outbreak of World War II. But the stories he heard about his father's experiences as a flying officer with the British RAF instilled in him a lifelong concern for keeping aircraft safe from harm. The family eventually emigrated to the United States and settled in Wisconsin, where Howard attended high school and then entered the Marine Corps as an aircraft technician trainee.

He served two tours of duty in Viet Nam, then left the Marines to enter an A and P school at Janesville, WI, in 1969. There he earned a pilot's certificate as well as his Airframe and Powerplant papers—and soon afterwards an Inspector's Authorization. Most of his 15 years in general aviation have been in the employ of TransAir Aviation of Waukegan, WI, where he is currently general manager of the larger sales and service corporation.

Howard has built a reputation for dependability in his community on the principle that there is only one way to fix an aircraft and that is to fix it right the first time. Pilots and owners seek him out because they know that when they get their aircraft back it will work the way it should—with no excuses about lack of time, materials help, etc.

This year's outstanding flight instructor Genie Rae O'Kelley, was a junior high school teacher, a mother, and a homemaker—until her husband took up flying. A great believer in education, she decided to take a few basic lessons herself. She continued to learn until she became a certificated flight instructor herself, after receiving an offer she could not refuse: a teaching job in aviation from her own instructor.

In 1980 she became president and chief flight instructor of Volunteer Aviation of Knoxville, Inc., an FAA-approved flight school which she rescued from bankruptcy. Genie believes that the school's current success is based on the three "F"s that make learning enjoyable: Friendliness, Flexibility, and a Family-like environment. Safety is emphasized from the start with students frequently challenged by simulated emergencies ("we've lost the engine, you take it"). Higher than normal weather minimums are observed by low-time pilots and flight plans are a must for everyone. Video cameras are used to "show and tell" the students how they look in the air.

While instructing, teaching in public school, and raising her family, Genie found time to log over 8,000 hours, co-author the *Student Pilot Study Guide* published by Iowa State University Press, compete in the Powder Puff Derby and the Air Race Classic, and promote safety as an Accident Prevention Counselor and speaker.

On October 15, Mrs. O'Kelley and Mr. Siedlecki were flown to Washington, DC, where they were recognized by FAA for their exemplary work and rewarded by the general aviation industry with cash gifts and aviation equipment valued at over $5,000 each.

MICROWAVE DETECTORS LOCATE ATMOSPHERIC ICE

Icing-in-clouds observations will be made from ground-based instruments in the future, if a new microwave radiometer detection system now being tested by the National Oceanographic and Atmospheric Administration is successfully evaluated.

NOAA has reported that automated and continuously operating radiometers can be attuned to the wavelength of radiomagnetic energy emanating from supercooled water in clouds—and thus pinpoint the locality of icing conditions aloft near airports. At present, icing conditions are forecast on the basis of meteorological readings from instruments sent up with balloons once every 12 hours. The only current source of *observed* icing is pilot reports (PIREPs), when available. The microwave radiometer provides an update every two minutes.

Preliminary tests at Stapleton Airport in Denver showed the radiometer to have an accuracy of 90 percent within ten miles of the airport, and 77 percent within 50 miles—as corroborated by PIREPs. Some 30 stations will be established across the country for a three-year evaluation.

CRASH SURVIVAL KEYED TO SEATS, RESTRAINTS

A study of some 500 general aviation accidents by the National Transportation Safety Board, completed on March 15, 1985, has affirmed the importance of properly fitted seat belts and shoulder harnesses in reducing the serverity of injuries suffered by crash survivors. Furthermore, the investigation showed that approximately one third of these survivors could have benefited from seats with a higher energy absorbing capacity.

The findings of this investigation, together with a discussion of requirements and recommendations for maximum crash-survivability, are contained in a new FAA Advisory Circular, AC 91-65. Pilots are reminded that they are responsible for assuring that seat restraints, including harnesses when provided, are properly used by all occupants during takeoff and landing.

Pilots should also assure that hard, solid objects are not stored beneath the seats in small aircraft. These seats are designed to absorb energy downward; if there is no open space underneath for the seat pan to expand into, this safety feature may be nullified. During preflight inspections the seatbelt and harness straps should be checked for signs of deterioration, and the metal hardware should be examined for corrosion, cracks, missing bolts, etc.

Aircraft owners are cautioned against any unauthorized modification of the seat structure, such as drilling holes in the tubing for various attachments, which might weaken their integrity.

AC 91-65 is available without charge from DOT Distribution, M-494.3, Washington, DC 20590.

FAA GENERAL AVIATION NEWS welcomes comments from our readers. No anonymous letters will be used, but names will be withheld on request. Address: FAA GENERAL AVIATION NEWS, AFS-810, Washington, D.C. 20591.

• Cancel SVFR on Top?

If a person receives a special VFR clearance to depart a control zone which is below basic VFR weather minimums because of a low ceiling, and he climbs SVFR until he is on top of that ceiling, can he cancel his special VFR clearance while still in the control zone?

For example, an airport with a control zone has weather reported as three hundred broken visibility fifteen miles, with six tenths of the sky covered with clouds. Assume also that it was clear above the broken layer. Could a person, while complying with all restrictions of a SVFR clearance, climb on top of the ceiling and cancel his special VFR while still in the control zone?

W.M.
Hibbing, MN

Affimative. Once above the ceiling and in VFR conditions, a SVFR clearance is no longer required. Therefore, you would simply advise ATC that you were in VFR conditions and that you will remain in the VFR conditions while in the control zone.

• Glide Slope Failure

Assume you are making an ILS approach, using localizer bearing and glide slope indicator, to a runway where the ILS final approach fix is significantly displaced—say several miles—from the localizer final approach fix. Say that the glide slope signal goes out before you reach the localizer fix. What should you do? Climb back up to the ILS final approach fix altitude and maintain that altitude until you reach the localizer fix? Or do you hold the altitude at which you lost the glide slope signal until you reach the localizer final approach fix? Or do you simply descend to the MDA directly?

Luis A. Monserrate, Jr.
San Juan, PR

Once the glide slope signal fails you are in a non-precision approach—a localizer approach in the conditions you describe. You must adhere to the altitudes required for that approach, which are usually higher than the altitudes for an ILS approach.

You must not descend below the altitude shown on the approach plate for the localizer final approach fix before you reach that fix (Maltese Cross symbol). You may then continue the approach in compliance with the non-precision localizer approach minimums—or you may elect to execute a missed approach and request clearance for the localizer approach. In either case you should inform air traffic control of your situation and intentions as soon as practical. Be aware that the controller may refer to the approach in accordance with its designation in the IAP book (ILS, Runway XX) even though the glide slope is known to be down, and you will conform to non-precision approach minimums.

• Balloons in the Circle

In your May/June issue the article entitled "The Slashed Blue Circles" may leave balloonist readers with questions. The second paragraph on page 4 states that "all types of aircraft have access to the (ARSA) airspace," but page 6 quotes a rule that "No person may operate a hot-air balloon within an ARSA unless that person has prior authorization from the ATC facility."

Do not all aircraft have to get "prior authorization," or "prior approval" before entering an ARSA? Could you define this phrase as it applies here? Does it imply something other than a radio call—or a certain amount of advance notice? Most hot-air balloon flights launch at sunrise, when it may not be possible to contact some ATC facilities.

Also, would a hot-air balloon be granted approval to enter an ARSA more readily if it were equipped with a transponder? And how is a gas balloon or other lighter-than-air aircraft affected by ARSA airspace?

John J. O'Connell
Tallahassee, FL

The reference to balloons and prior authorization was derived from a statement in the *Airman's Information Manual*, which is in error and will be changed.

You are correct in your assumption that all aircraft, including all types of balloons and other lighter-than-air aircraft which are capable of maintaining two-way radio contact may enter an ARSA. Transponders are not required, although their use will certainly make it easier for ATC to issue traffic advisories to other aircraft.

"Prior authorization" is required whenever non-radio equipped aircraft want to enter the ARSA airspace. There is no particular advance time period, although pilots are encouraged to call far enough ahead to facilitate arrangements that will make possible a continuous course as desired.

Since balloons have limited maneuverability it is recommended that pilots communicate with ATC before the launch—if necessary, during the previous evening. But this again is not a requirement.

• Magneto Circuits

The article "Magneto Manipulation" in the July/August 86 issue is in error regarding the function of a grounding mechanism. The article indicates the grounding mechanism is a device "which interrupts the flow of electricity from the mag."

Just the reverse is true. The purpose of the grounding mechanism is to direct the flow of magneto primary current to ground, thus preventing electrical spark output.

Keep up the good work with a fine publication.

Walter Hagar
Blue Bell, PA

Thank you for taking the time to write us on the subject of magneto circuits.

Perhaps our statement should have read, "... the grounding mechanisms interrupts the flow of electricity from the mag to the spark plugs."

We also appreciate your compliments on our publication.

• S/E, M/E and IFR

I presently hold an instrument rating for single airplanes, and I'd like to be similarly rated for multi-engine airplanes. But I've heard there's a new rule that says if I fail my multi-engine rating test I will lose my single-engine instrument rating as well. Is this actually true?

Name Withheld

When the holder of a single-engine class rating with instrument privileges applies for a multi-engine class rating, with instrument privileges, and fails the instrument competency part of the test, he or she is issued a notice of disapproval indicating the area of failure. However, failure of any portion of the test requires a reapplication for the multi-engine class rating. In other words, the multi-engine class rating with VFR privileges is not automatically given to any pilot who passes the multi-engine part of the exam.

Furthermore an applicant who already holds an instrument rating in some other class or category of aircraft, and whose failure is due to lack of instrument competency (rather than specific multi-engine competency) may be required to demonstrate instrument competency prior to exercising instrument privileges in any aircraft.

• The "Numbers" vs ATIS

In your article on "Tips for Effective Radio Communications" (Sept./Oct. issue) you recommended using the phrase "Have numbers" as an apparent abbreviation for, "Have ATIS CHARLIE." Many years ago I remember that FAA issued a notice saying that it was unprofessional and possibly misleading to use the phrase "Have numbers" for this purpose. I believe this misuse led to an accident of some kind. Have we regressed on this issue?

Barbara L. Harper
Tuscon, AZ

The expression, "Have numbers" is legitimately used to inform the tower quickly that the pilot has listened in on a tower transmission and consequently knows the runway in use, wind direction and speed, and the altimeter setting. This is proper at airports which do not have an ATIS (Automatic Terminal Information Service) tape, or at times when the ATIS is down. Otherwise you would say, "INFORMATION BRAVO RECEIVED" or "HAVE INFORMATION CHARLIE" (see AIM 161D) to let ATC know what ATIS information you have.

• Instrument Competency Check

A pilot who has not flown for a year begins to fly again. Within a short period the pilot completes six hours of simulated instrument time of which at least three hours are in an airplane. This includes six instrument approaches with a safety pilot. At this point the pilot satisfies Part § 61.57(e)(1)(i). Must the pilot still pass an instrument competency check under Part § 61.57(e)(2)? It is assumed that the pilot has satisfied all other requirements such as biennial flight review, current medical, etc. Thank you.

Kathleen Abbey
Seville, OH

A pilot, who has not maintained instrument currency within the preceding 12 months, must take an instrument check under FAR § 61.57(e)(2) even though he/she may have recently acquired the six hours and six approaches accompanied by a safety pilot.

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